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10/587,745	06/23/2008	Heike Barlag	32860-001088/US	2476

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EXAMINER	
ROSENWALD, STEVEN ERIC	

ART UNIT	PAPER NUMBER
1759	

NOTIFICATION DATE	DELIVERY MODE
06/09/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/587,745	BARLAG ET AL.	
	Examiner	Art Unit	
	STEVEN ROSENWALD	1759	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 29* is/are pending in the application.

4a) Of the above claim(s) *27 and 28* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 26 and 29* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *28 July 2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claims 1 through 29 are presented for examination;

DETAILED ACTION

Specification

1. On page 7 the sentence "Figure 1 and Figure show the front face and rear face of a transducer array" will be interpreted as "Figure 1 and Figure *2* show". Appropriate correction is required.

Claim Objections

2. Claim 25 is cited as dependent on claim 1. During a telephone conversation with applicant's attorney, John Fitzpatrick, on 31 May 2011 it was determined that this claim should be dependent on claim 22. Examination will proceed with claim 25 considered dependent on claim 22. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 26 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claim 26, "*high* catalytic activity" is a relative term. The term "high" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1, 12, 17, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Girault et al. US 5635054 ('054) in view of Bentsen et al. US 2002/0195345 A1 ('345).

Regarding claim 1, '054 teaches a biosensor (col. 3 lines 27 – 31, col. 7 lines 7 – 9) operating on an electrochemical detection principle (col. 3 lines 56 – 57), having a transducer array (col. 1 lines 53 – 57, and col. 3 lines 23 – 26) containing a flexible metal/isolator composite (col. 1, line 51 and col. 3 lines 17 – 18) composed of a metal layer and an isolator layer (col. 1 lines 47 – 50) with a permanent connection between the metal surface and the isolator surface (col. 2 lines 31 – 32, col. 5 lines 10 – 13 and Figs. 1 and 2), the metal layer being in the form of a self-supporting metal substrate

(col. 5 lines 10 – 13 and col. 3 lines 17 – 18) and being structured in such a manner that metal areas which are electrically isolated from one another are produced (col. 3 lines 23 – 26), the isolator located on the metal substrate (col. 5 lines 10 – 13), being structured in such a manner that open metal surfaces remain as sensor surfaces in the isolator surface (Abstract and Figs. 1 and 2), discrete electrodes the individual metal areas each including associated individual measurement electrodes on the one hand and at least one reference electrode on the other hand (col. 3 lines 23 – 26 and claim 12).

However, '054 does not teach the structured metal areas are contactable with, on a side facing away from or opposite the sensor surface. Bentsen ('345) teaches (par. 0017 and Fig. 4D) electrodes ... may be connected ... on the first *and second* surface of the flexible polymeric substrate. "Second surface" reads on the claim. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to modify the microelectrode array of '054 with the second surface connection of '345 in order to enable the first surface bearing the exposed electrodes (to) be directly laminated to a fluid handling architecture that directs the fluid sample to the electrode array as taught by '345.

Regarding claim 12, '054 teaches (claim 13) that the reference electrode is an Ag/AgCl electrode.

Regarding claim 17, '054 teaches (a)n assay device … which is connected to a potentiostat (col. 4 lines 41 – 43).

Regarding claim 29, '054 teaches (col. 2 lines 24 – 25) conducting material is suitably a thixotropic *paste based on carbon* or metallic particles.

5. Claims 1 – 21 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bentsen et al. US 2002/0195345 A1 ('345) in view of Girault et al. US 5635054 ('054).

Regarding claim 1, '345 teaches a biosensor (par. 0011) operating on an electrochemical detection principle (par. 0025), comprising:

a transducer array (par. 0011), containing a flexible metal/isolator composite composed of a metal layer and an isolator layer (par. 0012) with a permanent connection between the metal surface and the isolator surface (par. 0051 and Fig. 4A), the metal layer being in the form of a self-supporting metal substrate (par. 0014) and being structured in such a manner that metal areas which are electrically isolated from one another are produced (par. 0015, 0027, 0043, 0051),

the isolator located on the metal substrate, structured in such a manner that open metal surfaces remain as sensor surfaces in the isolator surface (par. 0014) wherein, the structured metal areas are contactable with, on a side facing away from or opposite the sensor surface (par. 0017, Fig. 4D), discrete electrodes, the individual metal areas each including associated individual measurement electrodes on the one hand (par. 0012).

Bentsen in '345 is silent on at least one reference electrode. However, Bentsen does teach detection of electrical signals in response to biological events at the individual electrodes (par. 0024), that the charge potential of the electrodes can be

individually controlled (par. 0027), enzyme based electrodes (par. 0083), and analysis of antibody/antigen reactions (par. 0011). '054 teaches (col. 3 lines 23 – 26) that electrodes can be individually addressed to a set electric potential, (col. 3 lines 28 – 31) immobilization of reactants (enzyme or antibody) onto the insulating area by covalent bonding allowing direct application to biosensor and biochemical assay technology, a (col. 6 line 18) counter electrode (reads on reference electrode) for (col. 6 lines 42 – 47) voltammetric analysis with a working electrode and a controlled voltage secondary electrode (reads on reference electrode), and (claim 12 and see Figs. 6 and 7) a reference electrode. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to modify the biosensor of '345 with the reference electrode of '054 in order to enable the detection of electrical signals in response to biological events such as the enzyme based electrodes of '345 using voltammetry as taught by '054 (col. 3 lines 32 – 34 and col. 7 lines 6 – 14). Regarding claim 12, '054 teaches (claim 13) that the reference electrode is an Ag/AgCl electrode.

In regard to claims 2 – 26 and 29, '054 and '345 teach the device of claim 1 and;

Regarding claim 2, '345 teaches (par. 0051, 36 at Fig. 4C) vias (reads on cavities) wherein portions of substrate are removed or "milled" away from each of the electrodes, thereby exposing bare metal, and '054 teaches (col. 1, lines 47 – 50) apertures (reads on "cavities") formed in the layer of electrically insulating material and electrically conducting material visible through the apertures.

Regarding claim 3, '345 teaches (par. 0017) electrodes formed by exposure to the metal layer may be connected by metal traces to much larger contact pads located

elsewhere on the first or second surface of the flexible polymeric substrate. "Second surface" reads on "opposite side".

Regarding claim 4, '345 teaches (par. 0017) electrodes formed by exposure to the metal layer may be connected by metal traces to much larger contact pads located elsewhere on the first or second surface of the flexible polymeric substrate. "First or second surface" reads on "exposed on both sides".

Regarding claim 5, '345 teaches (par. 0017) electrodes formed by exposure to the metal layer may be connected by metal traces to much larger contact pads located elsewhere on the first or second surface of the flexible polymeric substrate. "connected by metal traces to much larger contact pads located elsewhere" reads on "laterally offset".

Regarding claim 6, '345 teaches (par. 0027) a plurality of electrodes and that the charge potential of the electrodes preferably can be individually controllable, and '054 teaches *apertures or groups of apertures* (with apertures created to expose electrode surfaces, see Abstract) within an array can be individually addressed to a set electric potential (col. 3 lines 23 – 24) and (col. 6 lines 14 – 22 and Figs. 6 and 7) a single sensor device comprising two electrodes with two electrically isolated metal areas.

Regarding claim 7, '345 teaches (Figures 2A, 2B, and 8E) microelectrodes extend through the flexible polymeric substrate from bottom surface to top surface to define corresponding microlocations (par. 0049) and that the substrate can have more than one layer and the metal traces may be positioned on one or more layers (par. 0055).

Regarding claim 8, '345 teaches (par. 0027) a plurality of electrodes and that the charge potential of the electrodes preferably can be individually controllable.

Regarding claim 9, '345 teaches (par. 0016) electrodes enlarged by deposition of additional metal … such as gold, and (par. 0052) (s)uitable metals include aluminum, gold, silver, tin, copper, palladium, platinum, carbon and various metal combinations (reads on noble metal alloy), and '054 teaches (col. 3 lines 17 – 18) electrodes can be made from different conducting materials (e.g. platinum, gold, carbon etc.).

Regarding claim 10, '345 teaches (par. 0016) electrodes enlarged by deposition of additional metal … such as gold (reads on noble metal alloy).

Regarding claim 11, '345 teaches (par. 0052) carbon (reads on graphite) and '054 teaches (col. 2 lines 6 – 8) a particular advantage when the electrode material includes carbon, since one photo-ablation used to form the apertures can vitrify (make glassy) one carbon in the areas of electrode material and teaches (col. 2 lines 24 – 25) (t)he conducting material is suitably a thixotropic paste based on carbon, which reads on the instant claim.

Regarding claim 13, '345 teaches (par. 0096) providing an electrolyte (sentence 1 reads on electrolyte), which prima facie wets electrodes (plural) and that "BSA was positively charged and accumulated at negatively biased electrodes" which reads on the instant claim.

Regarding claim 14, '345 teaches (par. 0046) (a) biasing signal (voltage or current) is applied to selected electrodes, thereby accelerating transport of the target species into the hydrophilic matrix above the selected electrodes. The biasing voltage is

subsequently stopped, with the target species concentrated at one *or more* of the microlocations, which reads on the instant claim.

Regarding claims 15 and 19, a person having ordinary skill in the art at the time of invention would have basic knowledge of the electrochemical circuits associated with the use of a potentiostat, including a two electrode cell, which includes a working and counter electrode, and a three electrode cell, which includes a working, counter, and reference electrode. (See, for example, Bard and Faulkner, Electrochemical Methods, 1980, John Wiley & Sons pages 136, 137, and 563 attached.) Girault in '054 teaches (a)n assay device … which is connected to (e.g. plugged into) a suitable potentiostat (col. 4 lines 41 – 43), a working electrode (col. 6 line 43), a microelectrode and a counter electrode (col. 4 lines 50 – 51), and a reference electrode coated with silver chloride (claim 13), and '054 also teaches that groups of apertures (with apertures created to expose electrode surfaces, see Abstract) within an array can be individually addressed to a set electric potential (col. 3 lines 23 – 24) and the use of an electrode made by the method of this invention for redox species analysis using voltammetry (col. 3 lines 32 – 34). Therefore, since a person of ordinary skill in the art at the time of invention would know that a potentiostat may be used in a two- or three-electrode configuration it would have been obvious to a person of ordinary skill in the art at the time of invention to configure the device as cited in claim 15.

Regarding claim 16, 345 teaches (par. 0096) providing an electrolyte (sentence 1 reads on electrolyte), which prima facie immerses the electrodes, and (par. 0017) the first surface bearing the exposed electrodes can be directly laminated to a fluid handling

architecture that directs the fluid sample to the electrode array, and '054 teaches (t)he micro-conducting areas of the electrode will be carbon and the (reference) electrode will be of silver/silver chloride and a sample of the water to be tested … will dissolve the salt and redox reagent (reads on electrolyte) forming a conductive solution between the electrodes (col. 6 lines 36 – 42).

Regarding claim 17, electrodes taught in the art as combined above can be connected to a potentiostat, therefore '345 is connectable.

Regarding claim 18, '345 teaches (par. 0017) electrodes connected to contact pads designed to mate directly with a voltage control unit, and (par. 0024) the voltage control unit simultaneously can provide processing currents or voltages, and (par. 0046) a biasing signal (voltage or current) is applied to selected electrodes, and '054 teaches (col. 4, lines 3 – 4) a programmed voltage scan (ramp or step formed) is used for the concentration measurement.

Regarding claim 20, '345 teaches (par. 0018) electrodes may be recessed within the vias (reads on cavities) in the flexible polymeric substrate, that biomolecules can be immobilized within the vias, and that biologically active molecules (par. 0022) are covalently anchored such that they are in contact with the array of electrodes (par. 0026), and '054 teaches (col. 3 lines 27 – 31) chemical immobilization of reactants (enzyme or antibody) onto the insulating area by covalent bonding in close proximity (col. 7 lines 12 – 13) between the electrode and the immobilized species (which reads on the instant claim).

Regarding claim 21, '345 teaches (par. 0056 and see Fig. 9, below) fluid handling architecture that is designed to confine a specified volume of sample-containing fluid as (a) single fluid volume over (an) array of microlocations, defined as (a) sample chamber.

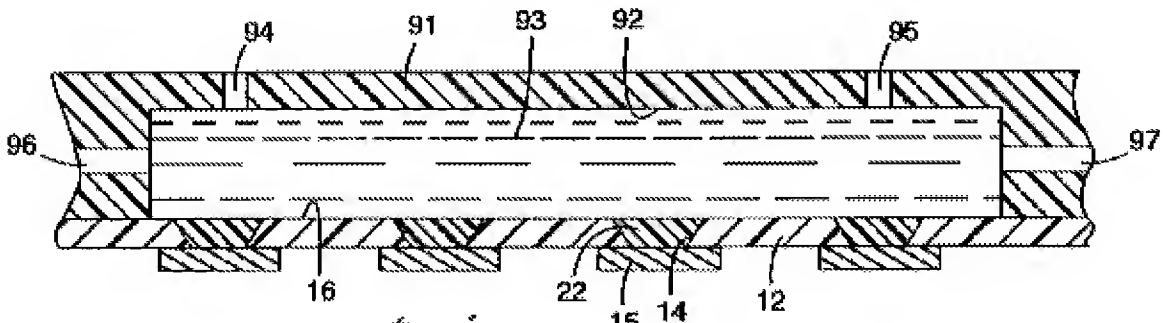

Fig. 9

As described in Fig. 9, 4 electrodes (15) are shown in the confined sample area (reads on cavity), although only one is labeled. Further, '054 teaches (col. 3 lines 23 – 26) that Apertures or groups of apertures within an array can be individually addressed to a set electric potential and therefore the electrode array could be used in multicomponent determination simultaneously

Regarding claim 29, '054 teaches (col. 2 lines 24 – 25) conducting material is suitably a thixotropic *paste based on carbon* or metallic particles and (col. 5 lines 19 – 20) a layer (of) cured carbon paste of a cured thickness of 500 microns. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to modify the device of '345 with the carbon paste of '054 so that where the paste is applied to a pre-drilled sheet of plastics material each aperture formed in the non-conducting sheet is substantially filled with conducting particles as taught by '054 (col. 2 lines 26 – 29).

6. Claims 22 – 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bentsen et al. US 2002/0195345 A1 ('345) in view of Girault et al. US 5635054 ('054) as applied to claims 1 – 21 above, and further in view of Hodges et al. US 2005/0173246 A1 ('246).

Bentsen et al. US 2002/0195345 A1 ('345) and Girault et al. US 5635054 ('054) are relied upon for the reasons given above, but neither teaches a separate metal surface closing a cavity.

Regarding claim 22, Figures 6 and 7 and the text at column 4 lines 27 – 49 of '054 teaches a working and reference electrode with a measurement area between them, and '345 teaches an enclosed sample chamber (par.0056 and Fig. 9 below, see claim 24), but '054 and '345 do not disclose a separate metal surface closing a cavity. However, Hodges teaches (par. 0050 and Fig. 1) a biosensor in the form of a thin strip membrane 1 having upper and lower surfaces 2, 3 and having a cell zone 4 defined between a working electrode 5 disposed on upper surface 2 and a counter electrode 6 disposed on lower surface 3. Hodges also teaches (par. 0002) (e)lectrochemical biosensors generally comprise a cell having a working electrode, a counter electrode and a reference electrode. Sometimes the function of the counter and reference electrodes are combined in a single electrode called a "counter/reference" electrode.

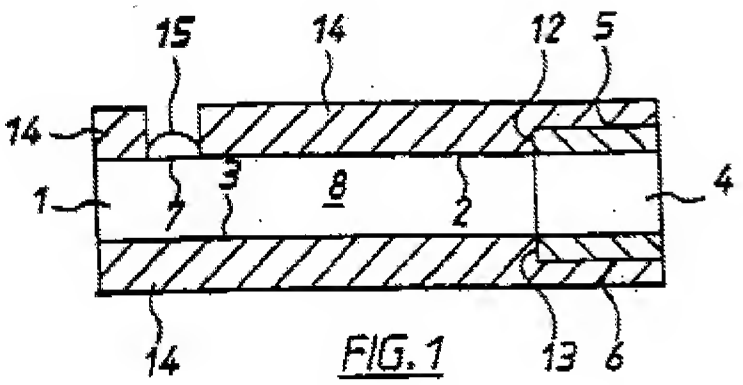

FIG. 1

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to modify the biosensor of '345 in view of '054 with the working electrode disposed on upper surface and a counter electrode 6 disposed on lower surface of '246 so that the electrodes are separated by a distance "1" which is sufficiently close that the products of electrochemical reaction at the counter electrode migrate to the working electrode during the time of the test and a steady state diffusion profile is substantially achieved as taught by Hodges (par. 0050).

Regarding claim 23, '345 teaches (par. 0017) electrodes connected to contact pads designed to mate directly with a voltage control unit, and (par. 0024) the voltage control unit simultaneously can provide processing currents or voltages, and (par. 0046) a biasing signal (voltage or current) is applied to selected electrodes, and '054 teaches (col. 4, lines 3 – 4) a programmed voltage scan (ramp or step formed) is used for the concentration measurement, and '246 teaches (par. 0011) applying an electric potential difference between the electrodes.

Regarding claim 24, '345 teaches (par. 0056 and see Fig. 9, above) fluid handling architecture that is designed to confine a specified volume of sample-

containing fluid as (a) single fluid volume over (an) array of microlocations, defined as (a) sample chamber.

As described in Fig. 9, 4 electrodes (15) are shown in the confined sample area (reads on cavity), although only one is labeled. Further, '054 teaches (col. 3 lines 23 – 26) that Apertures or groups of apertures within an array can be individually addressed to a set electric potential and therefore the electrode array could be used in multicomponent determination simultaneously, and '246 teaches a working electrode disposed on upper surface and a counter electrode disposed on lower surface in Fig. 1 of '246 and that (par. 0002) (e)lectrochemical biosensors generally comprise a cell having a working electrode, a counter electrode and a reference electrode. All 3 devices are considered to read on the instant claim.

Regarding claim 25, for examination purposes claim 25 is considered to be dependent on claim 22. '054 teaches (claim 13) a silver/silver chloride reference electrode and '246 teaches (par. 0081) silver halide (reads on chloride) may also be used to form the counter/reference electrode.

Regarding claim 26, claim 26 has been rejected under 35 U.S.C. 112, second paragraph, as being indefinite. However, '345 teaches (par. 0016) electrodes enlarged by deposition of additional metal … such as gold, and (par. 0052) (s)uitable metals include aluminum, gold, silver, tin, copper, palladium, platinum, carbon and various metal combinations (reads on noble metal alloy), and '054 teaches (col. 3 lines 17 – 18) electrodes can be made from different conducting materials (e.g. platinum, gold, carbon etc.). Any of the listed metals would be considered to read on the instant claim.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEVEN ROSENWALD whose telephone number is (571)270-1149. The examiner can normally be reached on M-F, 8A to 4:30P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey Barton can be reached on (571)272-1307. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. R./
Examiner, Art Unit 1759

/Jeffrey T Barton/
Supervisory Patent Examiner, Art Unit 1759

2 June 2011